

Application No. 09/894,375

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REMARKS

In the Official Action mailed 12 June 2003, the Examiner reviewed claims 1-31. The Examiner has withdrawn claims 15-31 from consideration as subject to restriction requirement; rejected claims 1, 3-7, 9 and 11-14 under 35 U.S.C. Section 103(a); rejected claims 1, 2, 4-11, 13 and 14 under 35 U.S.C. Section 103(a); rejected claims 1, 4-7, 9 and 11-14 under 35 U.S.C. Section 103(a); and rejected claims 1, 3-7, 9 and 11-14 under 35 U.S.C. Section 103(a).

Applicant has amended claim 1, cancelled claims 9, 11, 12 and 15-31, without prejudice, and added claims 32 -34. Claims 1-8, 10, 13, 14 and 32-34 are now pending.

Restriction Requirement

Claims 15-31 have been cancelled without prejudice in view of the Examiner's requirement of restriction.

Rejection of Claims 1, 3-7, 9 and 11-14 under 35 U.S.C. 103(a)

Claims 1, 3-7, 9 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (U.S. Pat. 6,316,097). Claim 1 has been amended to clarify that the substrate is metal, and the surface of the substrate is characterized by chemical and mechanical variations that are masked by the thin metallic layer caused by the smoothing processes, stated by implication in the original claim. The Liu et al. patent does not include at least the following limitation of claim 1:

providing a metal substrate having a surface characterized by chemical and mechanical variations with an average surface roughness of about 30 Angstroms, or smoother.

Liu, et al. describes a process using glass substrates or other materials "having a Young's Modulus greater than that of Al-based substrate materials." (See Abstract of Liu et al.) Furthermore, the Examiner acknowledges that the reference does not disclose providing a substrate with an average surface roughness of about 30 Angstroms or smoother. Rather, the Examiner states without support, and relying on *In re Aller*, that it would have been

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obvious in view of Liu et al. to provide such substrate. In particular, the Examiner identifies the comment at column 9, line 8-12, suggesting that utilizing smooth substrate blanks with an average surface roughness of less than 100 Angstroms could be applied to eliminate any subsequent polishing step.

However, the present claims recite the critical range of 30 Angstroms, or less, on metal substrates. This range is critical, as stated in the specification of the present invention, for the purposes of achieving super smooth results that are necessary for modern flying heights for heads on magnetic disk drives, with reduced requirements for polishing of subsequent metal layers. See paragraph [0028], on page 8, line 29 through page 9, line 3 of the present specification. As described in the present application, the use of super smooth aluminum substrates characterized by chemical and mechanical variations leads to the so-called "carpet" effect. The "carpet" effect causes the results of the plating to have a poorer surface roughness characteristic (carpeting), when starting with a super smooth substrate (See paragraph [0030], on page 9, lines 11-15 of the present specification). Liu, et al. discusses glass substrates that are not super smooth and that are critically different. Unlike the situation of the *In re Aller* case, the present invention operates in a régime representing a substantial difference in kind of process, and in kind of results, relative to the teaching of Liu et al.

The offhand comment by Liu et al. that a glass substrate may be provided with an initial surface roughness of "<100 Angstroms" in the Liu et al. patent demonstrates that the reference was not concerned with super smooth metal disks. Indeed, the Liu et al. patent suggests that the glass substrate to be used would be characterized by "poor lapability/grindability." (See, Liu et al. column 7, lines 3-8). Therefore, rather than suggesting that the substrate be provided with a super smooth surface, Liu et al. is suggesting that one should not attempt to polish the substrate to a super smooth state, as recited in the claims of the present invention. Rather, Liu et al. teaches that one can avoid "preliminary grinding/lapping/polishing of the substrate prior to layer deposition thereon." (See, Liu et al., column 10, lines 25-27). It is unquestionable that Liu et al. does not suggest applying its technique in the régime of the present invention, where the metal substrate has been finely polished to a super smooth state prior to the deposition of the thin metallic layer. It is noted that the process of fine polishing a metal substrate to a

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super smooth state prior to deposition of the thin metallic layer, also introduces patchy non-uniform regions of cold work.

Accordingly, is submitted that the Liu et al. reference does not suggest the process recited in claim 1, including providing a substrate with a super smooth surface, characterized by chemical and mechanical variations.

Claims 3-7, 9 and 11-14 depend from claim 1 and are allowable for at least the same reasons, and because of the unique combinations recited therein.

Accordingly, reconsideration of the rejection of claims 1, 3-7, 9 and 11-14 is respectfully requested in view of the foregoing comments and clarifying amendments.

Rejection of Claims 1, 2, 4-11 and 13-14 under 35 U.S.C. 103(a)

Claims 1, 2, 4-11 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nanis (U.S. Pat. 5,405,646) in view of Tada et al. (U.S. Patent No. 6,123,603). As mentioned above, the present invention is based on the discovery of the unexpected result that providing a substrate having a super smooth surface characterized by chemical and mechanical variations, as a starting material in the manufacturing of a magnetic disk, can be achieved by the claimed process without suffering that so-called "carpet" effect arising from the use of such substrates in the prior art. The Nanis '646 patent is my own prior invention. It does not recognize the applicability of the process to a procedure that includes providing a substrate having a super smooth surface as discussed above. The Examiner has relied on the Tada et al. reference to suggest this step.

However, the Examiner is misreading Tada et al. In particular, the Examiner cites the abstract of Tada et al. In the abstract of Tada et al., the surface roughness which is being described is that of the finished disk, rather than that of the substrate provided at the beginning of the process. It is acknowledged that Tada et al. has used the terminology about surface roughness in a confusing manner. However, reviewing the Tada et al. patent as a whole, it becomes clear that its entire premise is about polishing of nickel-phosphorus in a sequence of increasingly finer polishing compounds. See, Tada et al. column 2, lines 53-56. The polishing steps are applied to the nickel-phosphorus plated substrate, rather than to the substrate prior to deposition of such layer. The roughness of the aluminum blank, prior to deposition of the layer of nickel-phosphorous is not

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mentioned in Tada et al. The only place Tada et al. mentions processes prior to the polishing of the nickel-phosphorous is at column 1, lines 13-38. Nothing in the Tada et al. patent suggests starting with a super smooth substrate, and then applying a thin metallic layer to mask chemical and mechanical variations of the surface of the substrate to reactively or catalytically nucleate electroless plating of a nickel alloy, such as nickel-phosphorus.

Therefore, the combination of Nanis '646 and Tada et al. does not provide a prima facie case of unpatentability. For the reasons discussed above, it is submitted that claim 1 recites a process which distinguishes in kind over the prior art, and provides superior results for substrates which, as a result of preparation to provide a super smooth surface, are characterized by chemical and mechanical variations which would otherwise interfere with the growth of smooth layers on that surface.

Claims 2, 4-11 and 13-14 depend from claim 1 as amended, and are believed allowable for at least the same reasons.

Accordingly, reconsideration of the rejection of claims 1, 2, 4-11 and 13-14 over the combination of Nanis '646 and Tada et al. is respectfully requested.

Rejection of Claims 1, 4-7, 9 and 11-14 under 35 U.S.C. 103(a)

Claims 1, 4-7, 9 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ross et al. (U.S. Pat. 5,980,997) in view of Tada et al. (cited above). Like the Liu et al. and Nanis '646 patents discussed above, the Ross et al. patent does not describe surface characteristics of the substrate prior to deposition of nickel-phosphorus. The Examiner again relies on Tada et al. to suggest the step of providing a super smooth substrate, as recited in claim 1 of the present application and discussed in detail above.

Ross et al. is primarily concerned with adding a laser texturable layer to a glass substrate, and describes three variations of processes to accomplish this purpose. Other than the comment that the glass substrate be polished and initially smooth, there is no discussion in Ross et al. of average surface roughness, nor of chemical and mechanical variations of the glass substrate. (See, Ross et al., column 3, lines 50-51 and column 8, line 22). Indeed, cold work variations on and just below the surface are principally

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associated with metals which yield and smear when polished, rather than glass and ceramics which break in a brittle manner.

As discussed above, Tada et al. does not discuss the surface roughness nor the characteristics of the surface of the aluminum blank used in the manufacturing of the disk, and cannot be combined with Ross et al. to form a prima facie case of unpatentability.

Therefore, reconsideration of the rejection based upon Ross et al. is respectfully requested, in view of the comments set forth above, and the clarifying amendments.

Rejection of Claims 1, 3-7, 9 and 11-14 under 35 U.S.C. 103(a)

Claims 1, 3-7, 9 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agarwal (WO 94/15720) in view of Tada et al. (U.S. Pat. 6,123,603). Like the Liu et al., Nanis '646 and Ross et al. patents discussed above, the Agarwal et al. publication does not describe surface characteristics of the substrate prior to deposition of the adhesion layer it describes, nor prior to deposition of nickel-phosphorous on the adhesion layer. Furthermore, Agarwal describes the use of "non-metallic substrates." (See Agarwal Abstract). The Examiner again relies on Tada et al. to suggest this step of providing a super smooth substrate, as recited in claim 1 of the present application and discussed in detail above. We submit that the Examiner is mistaken as discussed in detail above, and respectfully request reconsideration of the rejection of claims 1, 3-7, 9 and 11-14.

New Claims 32-34

New claims 32-34 have been added to recite further novel combinations of the present invention.

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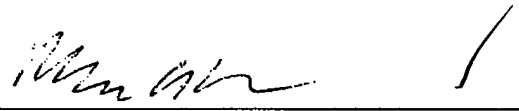
CONCLUSION

It is respectfully submitted that this application is now in condition for allowance.

The Commissioner is hereby authorized to charge any fee determined to be due in connection with this communication, or credit any overpayment, to our Deposit Account No. 50-0869 (NANS 1000-2).

Respectfully submitted,

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Mark A. Haynes, Reg. No. 30,846

HAYNES BEFFEL & WOLFELD LLP
P.O. Box 366
Half Moon Bay, CA 94019
(650) 712-0340 phone
(650) 712-0263 fax

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